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THE PROBLEM OF FUEL MEASUREMENT  
(THE SCHISKE "KONSUMMETER").

By K. R. H. Praetorius.

From "Der Motorwagen," March 31, 1925.

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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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THE PROBLEM OF FUEL MEASUREMENT  
(THE SCHISKE "KONSUMMETER").\*

By K. R. H. Praetorius.

A fuel-measuring device has already been described in No. 34, 1924, of "Der Motorwagen." In considering the innovations in this field, we can clearly see the trend of the endeavors to invent a measuring device which shall give not only the actual fuel consumption, which must then be converted by computation into kilograms per horsepower-hour, liters per hour or liters per 100 kilometers, but which shall render the latter values directly readable on a scale. On the test bench, as well as in the motor car, the rate of fuel consumption is a criterion of the functioning of the engine or its parts and any great variation in the rate of fuel consumption can call timely attention to any disturbances, so that the engine can be stopped before any great harm is done. Any measuring device, which immediately indicates the rate of fuel consumption in the desired units, has the advantage of saving considerable time and fuel, besides facilitating the adjustment of the carbureter.

The Schiske "Konsummeter" (made by the "PS-Vergaser- und Apparatebau A.-G.") was designed from the above viewpoint. This apparatus is preeminently suitable for both bench and flight

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\* From "Der Motorwagen," March 31, 1925, pp. 187-189.



tests of engines. It is built on the principle of communicating tubes. Fig. 1 is a longitudinal section through the "Konsummeter" and Fig. 2 an exterior view of the same. The glass panel  $t_1$  and the inner tube  $a$  represent the communicating system. The upper fuel tank 2 has a tube  $c$  projecting at the top and provided with perforations. The fuel falls through this tube into the measuring chamber 1. It is not conducted directly to the measuring chamber from above, as shown diagrammatically in Fig. 1 for the sake of clearness, but through cock 8 from below. The measuring chamber now fills to the upper end of the overflow tube  $d$ , while fuel flows simultaneously through the nozzle  $b$  into the tube  $a$  and rises in the latter. Between the nozzle  $b$  and the tube  $a$  there is a branch tube, with the cock 4, which leads to the carbureter. The fuel overflowing into the overflow tube  $d$  passes down through the latter and through the opening  $e$  into a tube connected with the tank 3. This overflowing fuel serves to keep the surface of the liquid at the right height. The inner measuring tube or gage is provided with two scales, one of which is designed for fine measuring and the other for the measurement of larger outflowing quantities. For these two cases there are two different calibrated nozzles in two separate channels, which can be thrown in or out at will by turning the cock  $f$ . On turning said cock, the corresponding scale is brought automatically into the field of vision.

Operation.— First turn the handle 6 of the cock  $f$  into



the desired position. Then turn handle 7 of the control cock on the lower tank 3 likewise into the desired position and open wide the fuel cock 8. The fuel will then flow from tank 2 into the measuring chamber, fill this and flow over the upper edge of the overflow tube (located concentrically around the measuring tube) into the collecting tank 3. Simultaneously the carbureter float-chamber begins to fill through cock 4 and the measuring column assumes the zero point of the scale, whereupon the engine can be started. In estimating intermediate values, it must be remembered that the scale divisions do not increase uniformly.

During the fuel-consumption tests, especially at low horse-powers, a larger portion of the fuel passes into the tank 3, due to the permanent opening of the fuel cock 8, so that it may happen that the collecting or overflow tank still contains sufficient fuel, after the upper tank is empty. This is evidenced by the fact that, on opening the fuel cock 8, the level of the fuel in the measuring chamber falls and there is no longer any overflow of fuel into the lower tank. To transfer the fuel from the lower to the upper tank, it is only necessary to turn the handle of the lower control cock so that the tube g is connected with the tube h. Then air is pumped into the tank 3 by means of the air pump 5 and the fuel is forced into the upper tank, into which it flows from the tube i. The completed emptying of the lower tank is indicated by the noisy ascent of air bubbles in the measuring chamber, whereupon the handles 6



and 7 are returned to the test positions, thus restoring the possibility of outflow from the upper tank. During this refilling period of only a few seconds, the carbureter is supplied automatically from the lower tank, without the fuel passing through the measuring device.

The readings are independent of the specific gravity of the fuel and of the pressure in the tanks. Even the jolts and tiltings of a motor car in road tests and the oscillations of the fuel surface in starting, braking and turning curves do not affect the accuracy of the readings.

As mentioned at the beginning, this apparatus indicates the rate of fuel consumption in liters per hour at any horsepower or revolution speed of the engine or at any speed of the motor car.

The experiments, already tried with the "Konsummeter," showed it to be very reliable, so that it is expected that this apparatus will soon be introduced into the engine and motor car factories.

Another story is the possibility of enabling the driver, not only on experimental runs but also during the ordinary use of a motor car, to read at any time the fuel-consumption rate with reference to any given unit. Also in this field, experiments are being tried and on an entirely different basis than hitherto. The results of these experiments will be published soon.



N.A.C.A. Technical Memorandum No. 315 Figs. 1 &amp; 2

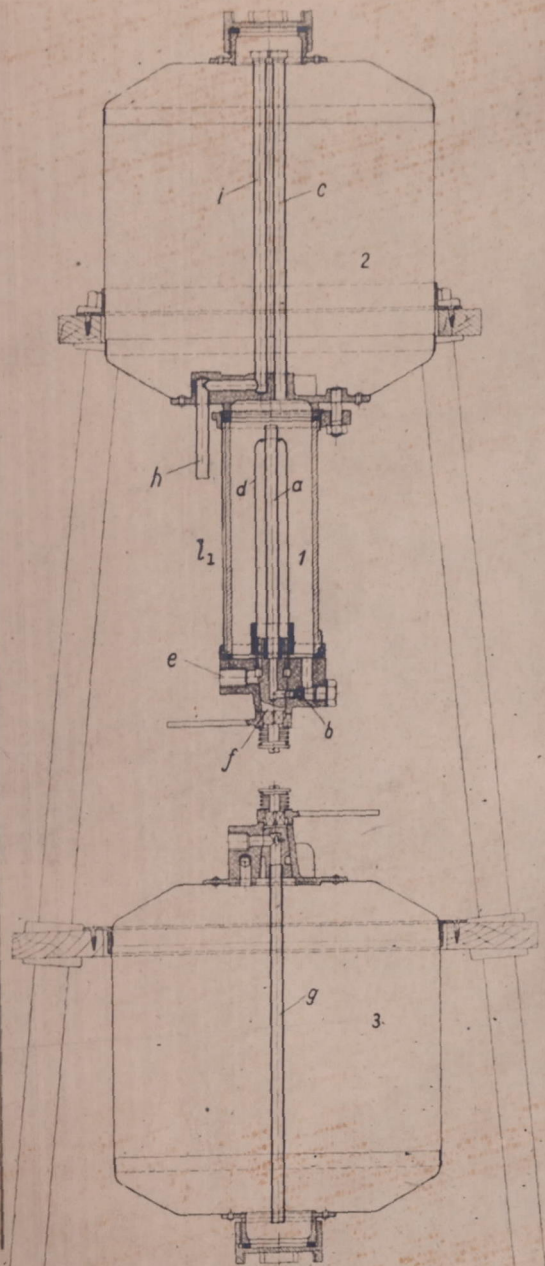


Fig. 1 Vertical section

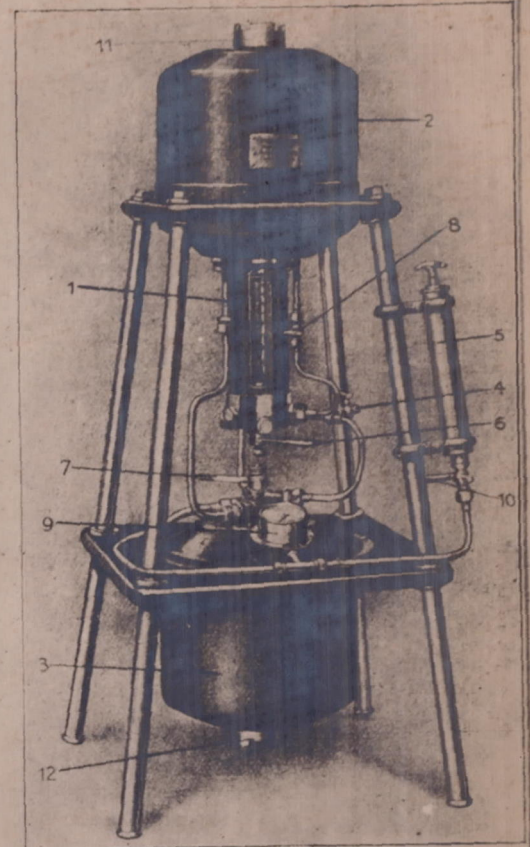


Fig. 2 Exterior view of the Schiske "Konsummeter".

Photostat to 6"